[HYPERLINK "http://www.epa.gov/"] ***International Considerations for Nanotechnology***

GOVERNMENT

U.S. and Japan: These countries are leading the race to commercialization of nanotechnology, which has the potential to impact every economic. The US has initiated a National Nanotechnology Initiative (nano.gov), while Japan considers nanotechnology research to be one of four strategic pillars for continued economic development.

Europe: Most EU members have embraced nanotechnology, but they are mostly involved in basic university research. There is less pressure/support for commercialization than in the US. Germany and Switzerland are leading the way in R&D, closely followed by the UK.

Source: *[HYPERLINK "http://www.fdimagazine.com/news/fullstory.php/aid/751/Small_wars:_Nanotechnology_is_on_the_verge_of_creating_a_global_revolution.html"]*

Government Funding by Country/Region:

Region	2000	2001	2002	2003	2004
W. Europe	200	~225	~400	~650	~900
Japan	245	~465	~720	~800	~900
USA	270	465	697	862	980
Others	110	~380	~550	~800	~900
Total	825	~1535	~2367	~3122	3680
(% of 2000)	100%	186%	287%	378%	443%

(Source: Estimates from NSF Reference: M.C. Roco, Journal of Nanoparticle Research 6: 1-10, 2004)

Nanotechnology R & D is occurring in over 50 countries

Western Europe funded ~US$650 million in 2003, from $126 million in 1997

Japan funded ~$800 million in 2003, from $120 million in 1997

US provided $862 million in 2003, from $116 million in 1997

UK recently announced $150 million funding over the next 6 years

Source: *[HYPERLINK "http://www.ianano.org/Presentation/Tran-ICNT2004.pdf"]*

U.S. Energy Security – Nano innovations will bring renewable technologies and improve energy conservation. This could help nations to wean themselves from dependency on foreign oil, especially the U.S., which has numerous benefits.

Source: *http://www.eere.energy.gov/*

BUSINESS

As more nations commit large amounts of funding to develop nanotechnology, government funding will stimulate private sector competition. Commercialization of new nano applications will have the greatest impact on economic development.

Global Nanotechnology Market: 2002, 2003, and 2008 est. (U.S. $Millions)

Product Categories	2002	2003	2008	AAGR % 2003-2008
Nanomaterials	5,825.6	7,366.6	21,434.8	23.8
Nanotools	168.0	181.0	1,241.0	47.6
Nanodevices	0	0	6,020.0	NA
Total	6,993.6	7,547.6	28,695.8	30.6

Source: *[HYPERLINK "http://www.ianano.org/Presentation/Tran-ICNT2004.pdf"]*

Global Climate Change & Kyoto Protocol

Russia has ratified Kyoto… ***[HYPERLINK "http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/press041118_eng.pdf"]***

Except for the U.S. and Australia, Kyoto will become effective and binding for most developed countries in February 2005. In the wake of Kyoto and voluntary measures by various governments, alternative energy markets are bound to expand (See Business Week, 8/16/04). New energy demand will spur clean, climate-neutral energy research on the nano-front, which is already under way: solar power, fuel cells, carbon filtration, atmospheric carbon capture, electro-magnetics, efficient electrical transmission & storage (See N.N.I., nano.gov).

Nano-Solar research, in particular, has been undertaken by Nanosys, Inc. (nanosysinc.com) – in partnership with Japanese firm Matsushita. Nanosolar (nanosolar.com), Konarka konarkatech.com), Iowa Thin Film (iowathinfilm.com) Siemens Solar (siemenssolar.com), Shell, and BP Solar are also highly invested in the development of viable solar energy sources.

The U.S. emphasizes the development of new energy technologies over mandatory caps. For that reason, many Federal agencies target nano R&D for clean, efficient and portable energy production through the Departments of Energy (esp. the new Office of Energy Efficiency), NASA, National Science Foundation, and Department of Defense.

Climate Change commentary from the Center for Responsible Nanotechology: *[HYPERLINK "http://crnano.typepad.com/crnblog/2004/11/climate_change_.html"] [HYPERLINK "http://www.crnano.org/benefits.htm"]*

NON-GOVERNMENTAL ORGANIZATIONS

"Global Dialogues on Nanotechnology and the Poor" – Meridian Institute:

Meridian Institute, funded by the Rockefeller Foundation and a Canadian public corporation, has partnered with the Foresight and Governance Project of the Woodrow Wilson International Center for Scholars to launch this dialogue. It will focus on environmental and health concerns but especially on nanotech's potential to help developing countries, by transferring technologies to clean water supplies and produce cheap, clean electricity.

Sources: *[HYPERLINK "http://www.merid.org/news.php"], [HYPERLINK "http://www.nanodialogues.org/"]*

"International Dialogue on Responsible Research and Development of Nanotechnology" – Meridian Institute & National Science Foundation (NSF):

This conference was held on June 16-17, 2004 in Alexandria, VA. Attendees, from Argentina to the U.K. were asked to complete a nano questionnaire, which they returned to Rex Raimond at the Meridian Institute by April 2004. The following is a sample response from Australia on page 5, related to the ethics of stakeholder engagement and equitable nano development:

- *Adequate resources and infrastructure to engage the community in nanotechnology issues (How do we ask permission to introduce new technologies? Whose needs are being served and how do we offer choice?)*
- *Adequate resources devoted to ensure that the needs of developing economies are addressed (in particular, for nanotechnology research in water, food production, appropriate manufacturing and health care)*
- *Mechanisms to ensure some equity is achieved in the benefits derived from nanotechnology between economies and regions.*

Source: *[HYPERLINK "http://www.nanodialogues.org/docs/Attachment%20F_Responses_and_Background%20Info_All_040816.pdf"]*

United Nations University Millenium Project: This is more comprehensive survey than above – "Environmental Pollution and Health Hazards Resulting from Military Uses of Nanotechnology." Look for Round 2 results in 2005.

Source: *[HYPERLINK "http://www.acunu.org/millennium/nanotech-rd2.html"]*

The Royal Society - UK 's national academy of science release a widely distributed report, "Nanoscience and nanotechnologies: opportunities and uncertainties" (July 2004), rejects the need for a moratorium, but highlights the immediate need for research to

address uncertainties about the health and environmental effects of nanoparticles. It also makes recommendations about regulation to control exposure to nanoparticles.

Aside: Following the Royal Society's release on nano, Prince Charles commented that it was important, even at an early stage, to ensure that risk assessment keeps pace with commercial development; he argued that more could be done at EU level to achieve this aim.

Source: *[HYPERLINK "http://www.royalsociety.org/document.asp?tip=1&id=2023"]*

National Science Foundation: NSF has explored the "Societal Implications" of nanotechnology. The Foundation's mission with regard to nano is to "…enhance our ability to educate everyone earlier and to improve the quality of public debate…enable scenario analyses, strategic planning, and simulated public debates to be more informative and rich. At its best, the research attitude is one of openness, curiosity, sharing, and constant improvement. This is a model for increasing the capability of the public and the scientific communities to plan intelligently, communicate effectively, respond to emergent circumstances, and understand themselves and the broader society and world in which they live and work" (p. 192).

Source: *[HYPERLINK "http://www.wtec.org/loyola/nano/NSET.Societal.Implications/nanosi-s65.pdf"]*

Foresight Institute: Eric Drexler is the well-known director. The Foresight Institute's goal is to guide emerging technologies so they can improve the human condition and the environment – rather than the opposite. Drexler conceived the infamous "gray goo" scenario in 1986 (regarding nanotech molecular manufacturing); this scenario was later dramatized in a Michael Crichton novel called *Prey*. The Institute is wary of government and business inattention to nano's fearful potential. Its guidelines are still very relevant for nano PR – see especially "Policy Lessons for Nano" and "A Future Based on Reflection and Responsibility."

Source: *[HYPERLINK "http://foresight.org/NanoRev/EricDrexler.html"]*

Foresight board member, Glenn Harlan Reynolds, wrote the following article on 10/10/02 – *[HYPERLINK "http://www.pacificresearch.org/pub/sab/techno/forward_to_nanotech.pdf"]*. He argues that we need to adopt both modest government regulation and open professional conduct to ensure public trust in nanotechnology.

Center for Responsible Nanotechnology: This site promotes the wise use of nano, but also lists the dangers of molecular manufacturing, which could be used to motivate public backlash against nanotechnology when molecular manufacturing becomes more widespread.

Source: *[HYPERLINK "http://www.crnano.org/dangers.htm"]*

International Council on Nanotechnology (ICON): This coalition of industry, academia, and environmental organizations launched in Houston, TX in late October 2004. ICON's purpose is to address nano concerns in an effort to avoid the GMO-type backlash. Environmental and citizens groups, such as the Canadian ETC Group, have been vocal in their hesitancy regarding this forum. They cite high levels of industry influence and fear that ICON will tend toward "greenwashing" rather than pressing for real precautionary measures. However, 2 of the 3 environmental groups invited to become founding members attended the first meeting, including the ETC and Environmental Defense. The NRDC representative did not attend.

Source: *[HYPERLINK "http://www.aaenvironment.com/NanoPress.htm"]*

International Congress of Nanotechnology: This is largely an industry group working to close the communication gap between nations – *[HYPERLINK "http://www.ianano.org/Presentation/Tran-ICNT2004.pdf"].*

Nanoforum: This organization is pan-European forum for nanotechnology, run by a mix of publicly and privately funded small tech groups – *http://www.nanoforum.org/events/fp6*

Nano-Tsunami: This Netherlands-based group seems to be a clearinghouse for nano news in Europe – *http://www.nano-tsunami.com*

Greenpeace: This high-visibility group activist group that more dollars be spent on research surrounding the unintended environmental fallout from nano – *http://www.greenpeace.org/international_en/*

ETC Group: On July 9th, called for a moratorium on the use of synthetic nanoparticles in the lab and in any commercial products until governments adopt best practices for research. ETC also advocates for the establishment of a United Nations body, the International Convention on the Evaluation of New Technologies.

Recently published "Down on the Farm," a comprehensive look at how nano-scale technologies will affect farmers, food and agriculture. A handful of food and nutrition products containing invisible and unregulated nano-scale additives are already commercially available. Likewise, a number of pesticides formulated at the nano-scale are on the market and have been released in the environment. This campaign is very closely related to the GMO debate – they are clearly trying to leverage similar concerns for nano.

Source: [HYPERLINK "http://www.etcgroup.org/search.asp?theme=11"]